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## EUROPEAN PATENT APPLICATION

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Integrated optical device and method for manufacturing thereof.

An integrated optical device comprising a substrate (1); a single-mode optical waveguide having a cladding layer (12) disposed on the substrate (1) and a core portion (4, 5) embedded in the cladding layer (12) and for transmitting light therethrough; and a stress applying film (31) disposed on a desired portion of the cladding layer (12) and for adjusting stress-induced birefringence of the single-mode optical waveguide by irreversibly changing a stress exerted on the core portion (4) by trimming technique. The integrated optical device can be manufactured by the steps of forming a cladding layer (12) on a substrate (1); forming a single-mode optical waveguide having a core portion (4, 5) embedded in the cladding layer (12) and for transmitting light therethrough; and forming, on the cladding layer (12), a stress applying film (31) for exerting a stress on the single-mode optical waveguide to irreversibly change the stress by trimming the film (31). The device exhibits a precisely adjusted birefringence and a desired polarization dependence or independence and is effective for constructing an integrated optical device for optical communication, for optical sensor or for optical signal processing, in which the polarization characteristics play an important role.

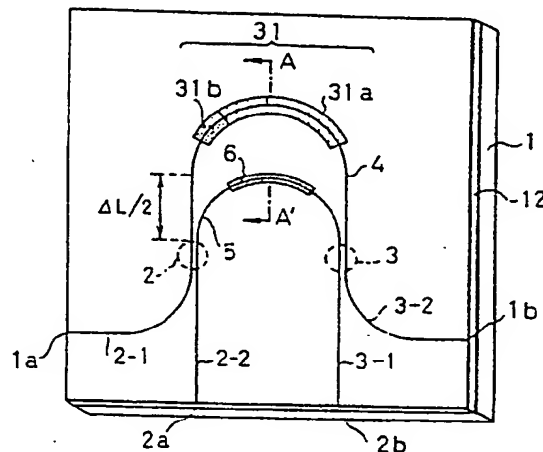


FIG. 1



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# EUROPEAN SEARCH REPORT

Application Number

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y,D	TECHNICAL DIGEST OF OFC/I00C January 1987; M. KAWACHI et al.: "Birefringence control in high-sillica single-mode channel waveguides on silicon", pager TUQ31 * in total *	1,4	G 02 B 6/12 G 02 F 1/01 G 02 F 1/21
A	idem ---	3	
Y	DE-A-3 005 395 (A. CARENCO) * claims 1,2,4; page 8, last paragraph; figure 1 *	1,4	
A	---	5-7	
A	APPLIED OPTICS vol. 24, no. 5, March 1985; J. JACKEL et al.: "Thermally tuned glass Mach-Zehnder interferometer used as a polarization insensitive attenuator"; pages 612-614 * in total *	1,4	
A	US-A-4 561 718 (A.R. NELSON) * abstract; figures 1,3.1,4.1; column 3, lines 14-35 *	1,4	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	APPLIED OPTICS vol. 22, no. 24, December 1983, pages 4082-4087; M. AHMED et al.: "Mach-Zehnder interferometer tuning with Ta2O5 film loading" * items I,VI,VII; figure 1 *	1,4	G 02 B G 02 F
A,P	PATENT ABSTRACTS OF JAPAN vol. 12, no. 411 (P-779)(3258), 31st October 1988; & JP - A - 63 147 145 (NTT CORP.) 20-06-1988 --- -/-	1,4	
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 27-04-1989	Examiner HYLLA W.A.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A, D P	EP-A-0 255 270 (NTT CORP.) * abstract; claims 1-6; column 8, lines 11-40; figures 4a-e * -----	1,4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
The present search report has been drawn up for all claims			
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<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  .....  &amp; : member of the same patent family, corresponding document</p>			

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